Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

**3D Hydrodynamic Simulations of Atmospherc-Pressure Inductively-Coupled Plasma Torches and Microwave Plasma Torches** PETER WILLIAMS, Agilent Technologies — We have performed fully 3D hydrodynamic simulations of atmospheric-pressure inductively coupled plasma (ICP) torches and microwave plasma (MP) torches. These simulations closely mirror the plasma conditions in ICP and MP torches designed for elemental analysis in commercial ICP-MS and MP-OES systems. Towards the goal of understanding transport in our torches, we show when and where we believe these torches may have turbulent flow. Our goal is to understand and hopefully reduce such turbulence as it is thought to lead to reduced instrumental sensitivity. Previous literature that investigated turbulence in ICPs via simulation has largely done so using 2D hydrodynamic simulations coupled with turbulence models such as k-epsilon. The advantage of this approach is an enormous savings in computational cost. The disadvantage is that models are only rough approximate representations of reality, and may give misleading results in some cases. Swirling flows in particular, such as exist in virtually all commercial ICP torches, present notoriously difficult problems for most turbulence models. It is for this reason that we have attempted to capture the turbulent breakdown directly. This requires high-resolution 3D simulations, which we have performed using the commercial package CFD-ACE.

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Date submitted: 15 Jun 2012 Electronic form version 1.4